

Effects-Based Operations and the Exercise of National Power

Major David W. Pendall, U.S. Army

Strategic Planner, National Security Agency, Fort Meade, MD

THE WORLD is connected globally in societal, economic, governmental, and *info*structural and infrastructural terms. As the United States faces 21st-century adversaries and national security challenges, it must acknowledge these threats as being distributed, networked, urban, and different from the 20th-century, nation-state, and military-power constructs it has historically organized against. Acting against such threats in traditional ways will be too costly, slow, and destructive. Adversaries will increasingly use new forms of warfare, network-based organizations, and exponentially increased levels of destructive effect to wage war.

Effects-based operations, as a core competency of future warfare, will leverage allies' kinetic and nonkinetic capabilities with global reaching effects. Current and future generations of officers, interagency partners, and the Nation need to understand, enhance, and embrace existing and emerging technologies and techniques that enable these capabilities. The military must now establish—in the mainstream defense community—new doctrine, organizations, training, leadership, materiel, and personnel systems to ensure the Nation is prepared to execute and defend against emerging forms of warfare.

The views expressed in this article are those of the author and do not necessarily reflect the position of the Department of the Army, the Department of Defense, or any other government office or agency. — Editor

Glimpsing the Future

We must hold our minds alert and receptive to the application of unglimpsed methods and weapons. The next war will be won in the future, not in the past. We must go on, or we will go under.

—General Douglas A. MacArthur¹

Envision warfare so transformed as to be almost unrecognizable, even by starry-eyed visionaries. In the kinetic realm, robots fight robots. In the nonkinetic realm, our chemicals defeat their chemicals, and our electrons overwhelm their electrons. Is this possible or plausible?

Clearly, future capabilities of combined and standing joint task forces (SJTF), coupled with specialized strike elements, will leverage the power of kinetic and nonkinetic weapons in future battlespace. Some battlespace will be located within sprawling urban environments and some will be against state and nonstate entities or both. Some of the capabilities used to achieve future desired effects might not be classed currently as weapons. Other battlespaces might be in the spaces between neurons or electrons. The cutting, burning, irradiating, poisoning, piercing, and concussion effects that enlivened combat in the 20th-century will persist, and other forms of engagement and effects will be added. Some weapons will be nonkinetic and will substitute for some of the fire and maneuver of times past.

Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE FEB 2004		2. REPORT TYPE		3. DATES COVERED 00-01-2004 to 00-02-2004	
4. TITLE AND SUBTITLE Effects-Based Operations and the Exercise of National Power			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) National Security Agency,Fort Meade,MD,20755			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSOR/MONITOR'S ACRONYM(S)		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 12	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Kinetic weapons, as defined here, are weapons whose effects are transmitted by the motion of a substance, such as a projectile, a shock wave, or heat. Departing from the conventional definition, nonkinetic weapons include—

- ▣ Sticky foams.
- ▣ Graphite bombs.
- ▣ Cyber weapons.
- ▣ Microwaves.
- ▣ Directed energy.
- ▣ High-energy radio frequency strikes.
- ▣ Calmatives.
- ▣ Acoustic weapons.
- ▣ Stink bombs.
- ▣ Antitraction and antireaction chemicals.²

These items will be transformational once they become available, although they are less interesting as technologies and more interesting because of their capacity as surrogates for kinetic fires and traditional maneuver.

The attacks of 11 September 2001 illustrate a global terrorist group's ability to conduct swarming attacks using the World Wide Web and E-mail for coordination and planning. Terrorists used U.S. soil and commercial schools for advanced training, ATM systems to access funds, and U.S. airliners as explosive projectiles.³ Print, cyber, and televised media became a real-time dissemination system for imagery and battle damage assessment, even offering postoperation-effects analysis for the adversary.

Commercial and public goods and services become the means with which to conduct war as well as being the targets of war by nonstate actors, whether or not they are terrorists, narcotraffickers, organized crime figures, or eco-activists. The emerging standard is to hide in the open, avoid unique signatures, and outsource infrastructure while denying its benefits to the adversary.

Some would argue that Taliban and al-Qaeda forces operating in Afghanistan massed and organized in ways akin to a conventional fighting force. Certainly, U.S. Armed Forces were innovative in the use of new technologies and organizing constructs to dominate the battlespace quickly and achieve battlefield success. However, we should not rely on future adversaries to make the mistake of massing organized conventional-like forces and attempting to fight from fixed positions or from a definable, targetable geographic base of operations. More likely, future adversaries will strive for global dispersion, operate from networked structures, and avoid decisive engagements with conventional forces on land, sea, or air. Adversaries will continue to rely on

uniting principles rooted in common value systems, profit motives, or cultural bonds.

America's segmented society, government, military, and economy continue to be the most studied in the world. America's position as the world's only superpower guarantees this attention. Because

Are other nations . . . limited in response if no kinetic shots are fired? Would America be in a global war on terrorism today if on 11 September 2001 al-Qaeda had caused . . . banking system shutdowns and massive emergency responder service disruptions through cyber means? What if these events had occurred over a period of weeks or months rather than on a single day?

America is so strong in developing military capabilities, its enemies began using asymmetrical strategies to avoid U.S. military strength. As long as America retains such an overmatch in conventional capability, it is unlikely to face opposition from another conventional force. North Korea and China remain as the only conventional military threats to U.S. military conventional force structure in the mid-to high-intensity realm.

Multilateral relationships. Just as happens in business, political and military partnerships and coalitions form, disintegrate, and reform, the issue at stake becoming the organizing and operating construct. Today, U.S. forces act as bodyguards for foreign heads of state and help destroy opposition elements.⁴ Nuclear-armed nation-states offer the United States the use of airspace and limited basing rights even as they verbally oppose U.S. actions against other nations in their region and carry out their own war mobilization against nuclear-armed neighbors.⁵ American and Russian military units, foreign affairs departments, scientists, and nongovernmental organizations (NGOs) carry out coordinated operations within nation-states, acting out of mutual interest.⁶ Every day, foreign hackers attempt cyber attacks or to emplace viral infections against America's critical infrastructure. Adversaries working within U.S. borders continue to plan, plot, and act.

The battlespaces in which the United States engages its adversaries are no longer "over there," and it can no longer defend its interests and provide its citizens security by being "over there." Defending the United States is now as much about local law-enforcement officers patrolling and protecting critical infrastructure nodes in Omaha, Nebraska, as it

was during World War II when U.S. servicemen stormed Omaha Beach.

America's defense must be local, regional, and global. Its economy, workforce, national infrastructures, foreign policy, national security, and psyche are

Secretary of Defense Rumsfeld has indicated a desire for special operators to deploy to countries on demand, achieve results, and then leave as quickly as they entered. This might occur with or without host-nation assistance or approval.

interlinked and interdependent. The Nation's nationally and globally integrated elements are the battlespaces and dimensions of 21st-century warfare. Although America might be first among equals, its conscious and unconscious existence is tightly coupled to experiences shared with its global neighbors.

Action elements. Like it or not, preemption is recognized as a legitimate form of self-defense. Future engagements are merely the branches and sequels flowing from what is being executed today. The variables are the degree of engagement, the methods of engagement, and how explicitly engagements become known to those not directly involved. Warfare can no longer be characterized as the conventional forces of a nation-state engaging in the delivery of munitions and destruction in pitched battles on land, sea, and air. Operations are no longer merely focused against an opposing nation-state's forces and means to make and sustain the fight.

The U.S. Special Operations Command (SOCOM) is to receive a 50 percent increase in annual budget, 4,000 additional operators, and broader responsibility to act around the globe. Secretary of Defense Donald H. Rumsfeld has indicated a desire for special operators to deploy to countries on demand, achieve results, and then leave as quickly as they entered.⁷ This might occur with or without host-nation assistance or approval. In testimony on 12 March 2002, General Charles Holland, former SOCOM Commander, ensured Congress that the special operations community could execute must-succeed operations and that such operations would be completed with "absolute certainty and professionalism."⁸

Special Operations Force (SOF) elements, integrated with Department of State, law-enforcement, cyberwarriors, host-nation, and even NGO elements will engage adversaries within the global landscape.

Operations will be overt, covert, and clandestine—simultaneously. One can even envision an e-SOF component conducting specialized high-risk, high-gain activities within the virtual world of U.S. adversaries. Acting within predetermined authority, scale, and commander's intent, 21st-century task forces will achieve a range of tactical through strategic effects with speed, precision, and from near and far.

A reduced observe-orient-decide-act (OODA) loop at the joint unit-of-action level, enabled by superbly trained, technology enhanced and empowered teams will achieve the results the newest national-security strategy envisions.⁹ The United States will engage adversaries in unexpected ways, leveraging new weapons and techniques and deploying forces from existing and future—perhaps even commercial—platforms to reach remote areas of the world. The United States will act with effects, rather than weapons, in mind.

SOF elements will become more specialized. Elite conventional forces will take the role of 20th-century SOF. Twentieth-century conventional (legacy) forces will transform; deploy rapidly; oppose nation-state and contrarian forces in politically acceptable environs; and ultimately remain technologically and morally dominant.¹⁰

New Patterns and Effects

Effects-Based Operations, I believe, [is] a sound concept but needs more refinement. We are not ready to go forward yet. . . .

—General William F. Kernan, Commander,
U.S. Joint Forces Command¹¹

The traditional military terms of maneuver and fires might be insufficient for use in the 21st century. Will forces fire and maneuver in the virtual realm? How does the concept of positional advantage apply against networked, technologically sophisticated adversaries (nation-states or nonstate actors)? Will the United States achieve dominant maneuver and precision engagement against a cyber or "de-massified," cellular enemy attacking critical national (governmental and commercial) infrastructure and global interests?

We might have to redefine warfare itself in the 21st century. If politics are the resolution of conflicts by peaceful means and war is politics by other means, how are we to describe events that are deliberately caused by external actors and that result in massive financial losses; influence shifts across sovereign governments and coalitions; major redefinition in internal value systems; and changes in social structures?

Iraqi prisoners being released
by the 101st Airborne Division,
18 May 2003.

US Army

The United States should explore its capability to deconstruct the network properties of [nonstate adversaries] and limit their attractiveness to new players. A range of human-based operations, whether classed as nation building, foreign aid, media campaigns, or PSYOPs, might achieve both. A catch-and-release program for suspected operatives might create reluctance or distrust in such suspects and prevent them from further acts.

Are other nations, as well as the United States, limited in response if no kinetic shots are fired? Would America be in a global war on terrorism today if on 11 September 2001 al-Qaeda had caused multiple airliner crashes, banking system shutdowns, and massive emergency responder service disruptions through cyber means? What if these events had occurred over a period of weeks or months rather than on a single day? Certainly the 1993 attack on the World Trade Center; the 1997 bombing of the U.S. barracks in Saudi Arabia; the 1998 attacks on the U.S. Embassy in Tanzania and Zaire; and the 2000 attack on the USS *Cole* did not compel the Nation to act decisively. Yet, al-Qaeda operatives also carried out these events.

What are the national thresholds and attack-classification schemes that will compel national elements of power to respond in the future? How will the United States implement the newest national security strategy in the broader terms and environments this century presents rather than those of the 20th century?

If the United States accepts that warfare can take multiple, interrelated forms in the 21st century, then

it should also envision multiple forms of proactive defense and defeat mechanisms. Maneuver, or the achievement of positional advantage, takes a multitude of forms, limiting the adversary's ability to function or act in optimal ways, and in effect, might deter the notion entirely. Employing desired effects on adversaries implies the concept of maneuver itself.

America must begin to think, develop, train, and advance concepts and techniques for new approaches within the mainstream defense community. The Nation must invest in the strategies and approaches necessary to attack root causes, impose will, or commit initiative-based warfare (whatever that means in the collective future), and find ways to introduce randomness, ambiguity, and chaos into adversaries' neural battlespace. America needs to integrate effects-based capabilities as a complement to civil-military-interagency operations as the latest national security strategy describes.

What is critical mass, centers of gravity, or the new battlespace calculus in the Third Wave environment?¹² How does the Nation prevent further coalescence or collusion of confederated forces against U.S. interests? The Nation should explore

21st Century Realities

Forms of war	Battlespaces	Effects	
<ul style="list-style-type: none"> • "Conventional" • Terror • Drug • Asymmetric • Nuclear/biological/chemical (weapons of mass destruction) • Information • Global economics and trade • Individual product • Agricultural • Ecological/environmental • Value wars • Idea wars • Genetic/biological/genome • International financial • Civil • Societal/cultural/tribal 	<p>Physical</p> <ul style="list-style-type: none"> • Rural • Urban • Cyber/virtual networks • Media • Space • Individual humans <p>Mental/Cognitive</p> <ul style="list-style-type: none"> • International/cultural • National/societal • Regional/subnational • Communities of interest • Leadership of subgroups • Familial • Individual 	<p>Effects</p> <ul style="list-style-type: none"> • Disorganization • Disruption • Degradation • Destruction • Denial • Deception • Distrust 	<p>Effects Duration</p> <ul style="list-style-type: none"> • Nanoseconds • Minutes • Hours • Days • Years • Generations
		<p>Orders of Effects</p> <ul style="list-style-type: none"> • First order (direct) • Second order • Third order • n-order 	<p>National Instruments</p> <ul style="list-style-type: none"> • Diplomatic • Informational • Military • Economic
<p>Conflict will always arise over the scarcity of resources and differences in values. What are the relationships and frameworks for the elements described above? Are we able to describe dominant maneuver, precision engagement, or full-dimensional protection across this framework in a clear, coherent strategy or single integrated operating plan? How is full-spectrum dominance achieved?</p>			

Figure 1. The various dimensions of the battlespaces we might operate within during the 21st century.

[The 9/11] terrorists used U.S. soil and commercial schools for advanced training, ATM systems to access funds, and U.S. airliners as explosive projectiles. Print, cyber, and televised media became a real-time dissemination system for imagery and battle damage assessment, even offering postoperation-effects analysis for the adversary.

the ways and means of increasing replacement costs for key adversarial leaders. We should attempt to qualify or quantify conditions within an adversary's network when the loss of network elements and the value proposition cause the adversary's wholesale collapse. The military needs a new lexicon and employment doctrine to describe the tools and proxies for the tactics needed to achieve full-spectrum dominance.¹³

What are the effects of fires in the 21st century? The military certainly seeks advantages in precision, range, speed, volume, and relative effect to the target. If U.S. forces can effect targets at will, they can change the battlespace calculus for warfare. As

forces employ precise effects, enabled by exquisite intelligence, they can work in advanced ways within the mental and psychological realm of adversaries. The results might be measured differently in the 21st century—different by orders of magnitude. Ultimately, the military will need to achieve an omnipresent, persistent effect (like gravity in the physical, terrestrial realm) on the minds and intentions of current and future adversaries. Figure 1 frames the various dimensions of 21st-century battlespaces.¹⁴

Desired Effects

Today's cancer drugs are notorious for killing healthy cells along with cancerous ones. A new anticancer approach could offer more of a precise option: kill just the tumor by choking off its blood supplies. The first drugs based on this approach are now in human trials and, if they work, could provide a virtually side-effect-free means of fighting a host of cancers.

—Technology Review¹⁵

Imagine how the Nation would act if it were denied the ability to protect its vital national interests on foreign soil? We now know that al-Qaeda coordinated the attack on the United States in Hamburg,

Germany. How would we have acted if we had known where these plots and commitments were being actualized, although host nations were unaware, unprepared, or unwilling to act? What if a host nation, characterized as a modern, globally connected economy, were to unwittingly harbor a parasitic threat but refuse to accept proof that cells existed within their borders? How would the United States eliminate the cells and act without creating great collateral damage in a major urban area and still create the effect desired on the targeted cells?

Envision the construct of effects-based operations applied by or to nonstate adversaries. Operating globally and within a loose, confederated-network construct, these actors coalesce either for ideological reasons or for profit motive (perhaps both). The United States should explore its capability to deconstruct the network properties of its organizations and limit their attractiveness to new players. A range of human-based operations, whether classed as nationbuilding, foreign aid, media campaigns, or psychological operations (PSYOPs), might achieve both. A catch-and-release program for suspected operatives might create reluctance or distrust in such suspects and prevent them from further acts or, perhaps more important, create distrust in the cell leaders of these individuals in the future.¹⁶ The captor would determine when to name names and when to remain silent. Multidisciplined intelligence operations would help understand and sense adversarial network operations.

Long-term foreign assistance through SOF and U.S. aid can reduce the numbers of disaffected people susceptible to adversaries' value systems and the attractiveness of those systems.¹⁷ Such operations can be goodwill initiatives that might be critical elements in achieving support from new coalition partners and, as such, provide secure operating bases and airspace usage, such as enjoyed in the former Soviet "stan" states north of Afghanistan. These operations also affect the capabilities and properties of the adversary's network, such as those who would render aid or abet adversaries. As an analogy, adversaries' software would become incompatible within U.S. operating systems and servers.

Effects-based operations, incorporating nonkinetic tools, perhaps, provide the flexible, scalable options needed in future environments. Host nations might turn a blind eye if we act judiciously and do not cause social or economical disruptions.¹⁸ Acting swiftly and decisively with or without attribution can also be enhanced using nonkinetic employment. The asymmetric options realized through kinetic and



A US Marine is immobilized during a sticky foam demonstration.

Combining lethal and nonlethal; kinetic and nonkinetic strikes; and engagement strategies creates opportunities and reduces current and future operating costs. These constructs now allow greater selectivity for physical force employment than at any other time in history.

nonkinetic capabilities have the real potential to achieve global pressure, reach, surprise, and perhaps most alarming to adversaries, a unilateral ability to act. Once the United States achieves persistent presence within the neo-cortical layer of an adversary's psyche, it might, in fact, achieve the true aim of national power.¹⁹

To attain the outcomes they are charged to achieve, combatant commanders should be armed with a greater range of these options. Combining lethal and nonlethal; kinetic and nonkinetic strikes; and engagement strategies creates opportunities and reduces current and future operating costs. These constructs now allow greater selectivity for physical force employment than at any other time in history. Even better, the United States has the conventional

National Guard troops assist airport security and local law enforcement in San Juan, Puerto Rico, February 2003.



US Army

Defending the United States is now as much about local law-enforcement officers patrolling and protecting critical infrastructure nodes in Omaha, Nebraska, as it was during World War II when U.S. servicemen stormed Omaha Beach.

overmatch; the scientific and technologic base; and the global reach to make this work.

Time is on the Nation's side—for the moment. However, America does not have a global monopoly on research investment, brainpower, and innovation. Seventy percent of the world's research occurs outside of the United States, and 70 percent of U.S. research is commercial. One futures study predicts orders of magnitude increases in weapons effectiveness and availability at orders of magnitude reduced costs.²⁰ In short, adversaries will soon be able to create catastrophic effects supporting their intended outcomes at bargain-basement prices.

The important element to take away from this construct is that the United States does not yet have a joint, interagency concept of operations to combine effects to achieve desired outcomes. The Nation has not developed a joint, integrated, full-spectrum warfighting doctrine and employment strategy for the full scope of effects the military can, currently and within the near future, bring to bear against adversaries across the scope and spectrum of 21st-century conflict.

Delivering effects. Friendly cyber or virtual operations live on the same networks and systems as adversaries' networks and systems. In most cases, both use the same protocols, infrastructures, and platforms. They can quickly turn any space into a battlespace. Operations within this battlespace might attempt to sense, attract, deny, disrupt, and manipulate the enemy at leadership, foot-soldier, and resource levels. By virtually maneuvering to seize digital instructions; understanding and then seizing cyber-based financial transactions (roughly equating to virtual fires against logistics); and introducing uncertainty to deny confidence in their distributed operation security, can the United States achieve effects comparable to lethal direct action against a handful of cells?²¹

Within physical-effects operations, both kinetic and nonkinetic, the military must achieve denial, disruption, defeat, and destruction of the functional elements of the network. Doing so can be characterized as actions against people and materiel.

Perhaps these are policy and strategy questions, but the answers to such questions will influence changes in tactics, in applying military force, and in exercising national power. The military needs to change the way it fights and the way it uses weapons systems to create greater options for commanders. Since fighting is the failure strategy, the Armed Forces should at least develop and use methods that do not compound this failure.²² As Forrest Gump might say, Transformation is as Transformation does.

The motivation for adding powerful new tools has never been stronger. For example, the ongoing Israeli-Palestinian conflict rages in the streets. Missiles, tanks, rockets, and suicide bombers destroy everything and everyone around them. In such circumstances, would we ask how would we fight? Perhaps the Israeli Defense Force's (IDF's) performance during the Seven Day War inspired U.S. General Don Starry to develop AirLand Battle Doctrine, which created conditions for America's 100-hour victory over Iraq during the Persian Gulf war.²³ Even so, the IDF is not the model to optimally use for carrying out strikes against adversaries in the 21st-century capabilities-based military using effects-based operations. The United States will expand the application of new tools in warfare.

Setting conditions. The U.S. Department of Defense might soon announce more definitive steps to create the SJTF as exercised in the Millennium Challenge 2002 exercise. SJTFs will bring effects-based targeting strategy more to the forefront. And, as SJTFs standup under unified commands, the syn-

ergies of each services' kinetic and nonkinetic warfare programs might be realized.

The continuous feeds from multiple types of sensors will provide multidimensional views of the target of interest as well as a persistent contact with the adversary that will further enable decision superiority and allow decisionmakers and operators to determine the optimal timing, tempo, and types of effects required to achieve selected outcomes.²⁴ The military will soon be able to achieve a level of predictive battle damage assessment through the use of advanced modeling, allowing ever more precise effects-based targeting.²⁵ This type of targeting and effects delivery will not be characterized by current precision weapons and modifiers, such as Tomahawk missiles or the joint direct attack munitions, able to achieve ballistic-effect delivery within a reduced circular probability of error; it will be characterized by a new level of precision based on the influence of the strike or action delivered on target with predetermined and pre-selected second, third, and n-order effects. To be sure, doing so will require nonkinetic and kinetic strikes and will continue to complement each other for achieving outcomes favorable for the Nation.

Influencing adversaries, aided by advanced simulations, such as influence-net modeling, will provide even greater insight for preoperational targeting, effects-based strike analysis, and poststrike assessments.²⁶ These tools will help us select branches or sequels or both in near-real time.²⁷ SJTFs with interagency and coalition components will have great resources and capabilities embedded within decisionmaking and execution frameworks. Commanders can act with a broader range of options, always seeking the best alternative for target effect and national outcomes. Knowledge is the fuel for operating in the 21st century. Speed and pervasiveness (global reach on demand) of action is the determinate factor in the outcome.

When the decision to employ effects is made, preoperational and postoperational cost savings will be measurable as well. Selecting the effect-and-employment method from the widest possible range of potential options reduces vulnerability and the requirement to establish robust secure forward bases and retains national agility and initiative. The military can act with precise effects, achieve results, and quickly change battlespace dimensions from one engagement to another. In short, truly integrating effects-based operations in support of national-security strategy can prevent the Nation from becoming mired in lengthy, costly force deployments in foreign lands.

Effects and their potential. If nonkinetic weapons, such as antitraction substances, can deny bridges from enemy use rather than destroying the bridge itself, then what is the compelling rationale for destruction? Achieving results through the use

Taliban and al-Qaeda forces operating in Afghanistan massed and organized in ways akin to a conventional fighting force. . . .

Future adversaries will strive for global dispersion, operate from networked structures, and avoid decisive engagements. . . .

Adversaries will continue to rely on uniting principles rooted in common value systems, profit motives, or cultural bonds.

of area denial or countermobility agents, rather than artillery-delivered family of scatterable mines or air-delivered antipersonnel, anti-vehicle, target-activated minefield systems, would be even better. If precision-directed, high-energy microwave or acoustic weapons can sense, fix, and disable or destroy urban snipers or barricaded enemy squads within apartment complexes, why should the military focus on attrition-based tactics, albeit with higher technology, although still "high-touch," force employments?

Graphite dust bombs and high-energy radio frequency weapons can destroy enemy command, control, communications, computers, and intelligence (C4I) systems and power-transfer stations.²⁸ Computer attacks can disrupt a variety of functions adversaries require across the spectrum of future war.²⁹ Media broadcast, information operations, host-nation support, and foreign aid can reduce targeted demographic group acceptance of state and nonstate actor anti-American messages and their value proposition. If such activities or effects reduce the enemy's capabilities, support structures, and resource bases, including current manning and future recruits, then employing lethality requires even more selectivity and prejudice.

Few question the capabilities and reach of today's U.S. military. U.S. forces can execute small-scale contingencies and dominate a conventional theater of war on order. Current questions about U.S. strategy are not about the ability to win decisively or what projected losses are or will be. Today's questions are about the costs of postwar cleanup.

Practical applications. Applying force requires exquisite intelligence down to the operator level provided over a secure, networked C4I structure. Data and intelligence flow is a key contributor to

Instruments of National Power

Diplomatic	Informational	Military	Economic
Forms of war	Battlespaces	Effects	
<ul style="list-style-type: none"> • "Conventional" • Terror • Drug • Asymmetric • Nuclear/biological/chemical (weapons of mass destruction) • Global economics and trade • Individual product • Agricultural • Ecological/environmental • Value wars • International financial • Civil • Societal/cultural/tribal 	<p>Physical</p> <ul style="list-style-type: none"> • Rural • Urban • Cyber/virtual networks • Media • Space • Individual humans <p>Mental/Cognitive</p> <ul style="list-style-type: none"> • International/cultural • National/societal • Regional/subnational • Communities of interest • Leadership of subgroups • Familial • Individual 	<p>Effects</p> <ul style="list-style-type: none"> • Disorganization • Disruption • Degradation • Destruction • Denial • Deception • Distrust 	<p>Effects Duration</p> <ul style="list-style-type: none"> • Nanoseconds • Minutes • Hours • Days • Years • Generations
<p>Orders of Effects</p> <ul style="list-style-type: none"> • First order (direct) • Second order • Third order • n-order 			
<p>Proxy patterns and tactics across all spectrums</p>			
<p>Maneuver</p> <p>Attack</p> <p>Defend</p> <p>Withdrawal/retrograde</p>	<p>Mobility/countermobility</p> <p>Direct and indirect fires</p> <p>Block/barricade/strongpoint</p> <p>Disperse/hide/rally/reform</p>	<p>Raid/pursuit/envelopment/exploit/turn/seize/secure</p> <p>Volumes of fire/suppressive fire</p> <p>Show of force/feint</p> <p>Recon/surveillance/screen/cover/infiltrate</p>	

Figure 2. What are the new terms of art for the 21st century?

the ability to achieve decision superiority and dominance over adversaries.

As the military learns more about the capabilities and limitations of the nonkinetic applications of force

Truly integrating effects-based operations in support of national-security strategy can prevent the Nation from becoming mired in lengthy, costly force deployments in foreign lands.

through exercise, simulation, and actual engagements, it can expect the coupling of kinetic and nonkinetic weapons with advanced precision-guided delivery systems, man-emplaced systems, and human-delivered effects. Sensor links to delivery platforms, using knowledge-based applications to speed information to the point or points of decision, will reduce the "D" time in the OODA loop, which in effect, will allow us to cycle through engagements and operational Go/No Go criteria with unprecedented speed. Decisions will be enabled at the lowest levels of operation. Given solid operational frameworks; an assured, accessible common relevant operating picture; and sufficiently detailed com-

mander's intent, tactical forces will shoot, move, and communicate to achieve effects against adversaries without the delays of a staff relaying, filtering, and interpreting the current battlespace condition.

Applying nonkinetic force is scalable and can reduce risks normally associated with the entry of U.S. forces. Operational risks are reduced as standoff increases (without the corollary loss of precision or effect). Nonballistic, if not nonkinetic force, solutions enable—wholly or in part—operators to act in close or standoff operations to achieve desired effects on the target entity, denying mobility and employing countermobility tools across the spectrum of conflict in the physical and the virtual realms. The next step is to explore, define, and develop the proxies for the physical tactics of warfare that have been so completely studied, and then train the force to employ them in the 21st century.

Figure 3, a notional example of an execution plan and time line, is a macro look at conducting outcome-based, effects-based warfare across multiple dimensions and battlespaces. Figure 3 also shows an artificially compressed timeframe and sequence of effects for descriptive purposes. For a globally networked adversary, forces would necessarily plan

TIME	TARGET	Intended result of potential effects based operations
Preoperation	Military Civilian Infrastructure Global	Warning fatigue Random services disrupted/media campaign Services disrupted/random power outages Economic fallout/trade disruption/corporate pullout
"H-Hour (H)" H-96	Military Services Infrastructure Global	False orders and rumors Services renewed/media campaign Services informed/warned/survival instructions Break in alliances/termination of credit/denial of trade
H-72	Military Civilian Infrastructure Global	Distrust/disorganization Most workers go home/services minimized/media campaign Services minimized/power outages Call for resolution/last-minute discussions
H-48	Military Civilian Infrastructure Global	Breakdown of commands/C2 disruptions/continued rumor Tailored messages/information campaign/multisource delivery Mobility networks disrupted/communications disrupted Postoperation services and organizations mobilized/prepared
H-24	Military Civilian Infrastructure Global	Leadership forced to relook alternates/adjust plan Population demonstrations/internal security on alert Services disrupted/random power outages Cable/commercial space coverage of live events/pundits provide commentary
H-12	Military Civilian Infrastructure Global	Widescale warning fatigue/C2 breakdown/false orders Random lockdown/revolt/media and diplomatic statement Only critical services rendered Functional interaction on isolated issues
H-6	Military Civilian Infrastructure Global	Units disrupted/Special Operations Forces engagement Lockdown/choosing of sides/perceptions formed Loss of controls Final calls for change of course
H	Military Civilian Infrastructure Global	Precision destruction of key nodes/kinetic/nonkinetic strikes Random broadcast and tailored information campaign Deny dual use services/protect important postoperation services Postoperation military/interagency/coalition and nongovernmental (NGO) elements deploy
H+12-H+48, UTC	Military Civilian Infrastructure Global	Deconstruct military and offensive capacity/C2 destroyed Isolated and contained Deny dual use services/protect important postoperation services Corporate reconstruction bids/venture capital surge/postoperational elements on ground
Postoperation	Military Civilian Infrastructure Global	Disband and reform Aid/reconstruction/debriefings/government formed Service restored/supplemented/government functions restored New relations/media coverage of postoperation/renewal of trade

Figure 3. Notional example of an execution plan and timeline.

Special Forces and 3d Infantry Division personnel establish a checkpoint to combat terrorist acts by Iraqi soldiers dressed as civilians, 23 March 2003.



US Army

SOF elements will become more specialized. Elite conventional forces will take the role of 20th-century SOF. Twentieth-century conventional (legacy) forces will transform; deploy rapidly; oppose nation-state and contrarian forces in politically acceptable environs; and ultimately remain technologically and morally dominant.

and execute this execution plan in the enemy's matching, mirrored battlespace, and it would be far less linear in the application of effects and even more customized and decentralized in delivery.

What if potential adversaries also have these weapons or tools?³⁰ Will the United States engage in mutually assured disruption? How would we do this against nonstate actors? This is the crux of the concern over rogue nations and terrorists obtaining weapons of mass destruction. These issues certainly affect homeland defense, coalition forming, and multinational support. Is this perhaps the Achilles' Heel of global giants?

The current concept of continuity of operations planning; mission and information assurance; and critical site and infrastructure protection take on critical necessity. The Nation's systems are, perhaps, the most vulnerable to network and asymmetric attack, given the overwhelming reliance and vast dimensions of U.S. governmental and commercial interests around the globe.

Imperatives for Transformation

We are fighting the first wars of the 21st century with a Defense Department that was fashioned to meet the challenges of the mid-20th century. . . . We have an industrial age organization, yet we are living in an information age

world, where new threats emerge suddenly, often without warning, to surprise us. We cannot afford not to change, and rapidly, if we hope to live in that world. — Donald H. Rumsfeld³¹

Perhaps terrorist organizations best understand effects-based operations. The attacks on 11 September 2001 had less to do with selected targets and more to do with the causation of synergistic effects.³²

Applying the notion of unrivaled information availability to the dimensions of the future battlespace forces us to conclude that future U.S. unified commanders must act locally, regionally, and globally simultaneously. Yet, they might lack frameworks for understanding these intersections—intersections that global businesses already understand.

Current stovepipes, also known as doctrinal underpinnings, present in each of the military departments and armed services, act to prevent potential synergies at this time. Effects-based operations require a full joint doctrine, organization, training, leadership, materiel, and systems approach to bring this concept to full potential. This construct should be born and bred under a joint organization; matured over time in joint applied operations; and nurtured within the service schools. If 21st-century weapons are only subsets of the tools for waging offensive and defensive war in the 20th century, then the

military must develop paths and educational systems to create the master craftsmen of the future. Somewhere in the ranks, most likely with 5 to 10 years of service under their belts, are the future unified commanders and senior defense chiefs who will realize the nature of the capabilities resident in many current prototypes.

What would the average midcareer officer's answer be if asked, "How do you conduct war?" Would the answer reflect 20th-century doctrine, tactics, weapons, and systems based on a service's parochial view and weapons programs? Or, would the officer respond with an understanding of today's realities of warfare? Could the Nation, faced with the circumstances Russia faced in October 2002, deal with the situation more effectively?³³ If the Nation trains mainstream operators in only narrow stovepipes, we will not be able to leverage the total power of its capabilities. If warriors only receive training in the use of hammers, every situation will look like nails.

The military must be prepared to take new tools and concepts into emerging multidimensional battlespace. A reluctance to act in new ways and a hesitation to apply novel tools and techniques will

*[Effects-based operations] should
be born and bred under a joint organization;
matured over time in joint applied operations;
and nurtured within the service schools.*

keep defense capabilities rooted in 20th-century warfare and lethargic in adopting breakthrough capabilities. The force must not wait until the perfect refinement is revealed. Spiral development deprives us of that excuse.

New circumstances require advanced technology; applied doctrine; modified organization; and expanded and integrated training. Leadership exposure and development to new art forms and tools, with prototypical materiel and technical insertion, must make their way into the operation force. A spirally developed system fielding integrated with inter-agency, homeland defense, and homeland security, is imperative in the 21st century.

Kinetic-based strikes and the service components employing them will not go away. Effects-based operations are the future. We must continue to develop effects-based operations as a joint-interagency construct from conception to execution. **MR**

NOTES

1. GEN Douglas A. MacArthur, Chief of Staff, 1931.
2. Aaron Zitner, "The Best Defense May Be A Good Offensive Stench," *Los Angeles Times*, 10 November 2002, 1.
3. John Arquilla and David Ronfeldt, eds., *Networks and Netwars: The Future of Terror, Crime, and Militancy* (Santa Monica, CA: RAND, 2001), 363.
4. John F. Burns with James Brooke, "Threats and Responses: Afghanistan; Karzai Under Heavy U.S. Guard, Travels to Honor Assassinated Resistance Leader," *New York Times*, 8 September 2002, 23.
5. Celia W. Dugger, "The Indian-Pakistan Tension: News Analysis; Seeking a New Ending," *New York Times*, 2 January 2002, 1.
6. Joby Warrick, "Risky Stash of Uranium Secured," *Washington Post*, 23 August 2002, 1. The article describes an NGO (nuclear threat initiative, a Sam Nunn-Ted Turner nonprofit entity) funding and coordinating an American, Russian, and Serbian operation within Yugoslavia to secure 100 pounds of weapons-grade uranium. This was an effort to ensure nonstate actors or criminal elements could not steal the material. The incident illustrates potential interstate agency-NGO operations of the future.
7. Rowan Scarborough, "Rumsfeld Bolsters Special Forces; Expands Powers in War on Terror," *The Washington Times*, 6 January 2003, 1.
8. GEN Charles R. Holland, statement before the Senate Armed Services Committee, Subcommittee on Emerging Threats and Capabilities, on the state of Special Operations Forces, 12 March 2002, on-line at <www.senate.gov/~armed_services/statement/2002/March/Holland.pdf>, 6.
9. The OODA loop concept is attributed to the late Colonel John R. Boyd, U.S. Air Force, Retired. For a discussion on the OODA concept as a strategic enabler, read Boyd, "A Discourse on Winning and Losing," and related works on-line at <www.d-n-i.net/second_level/boyd_military.htm>; The National Security Strategy, on-line at <www.whitehouse.gov/nsc/nss.html>.
10. See the Department of Defense's *Transformation Study Report, Executive Summary/Transforming Military Operational Capabilities*, 27 April 2001, on-line at <www.defenselink.mil/news/Jun2001/d20010621transexec.pdf>.
11. As quoted by the *New York Times* following Millennium Challenge 2002.
12. Alvin Toffler and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the Twenty-first Century* (Boston: Little, Brown and Company, 1993).
13. Weapons as described in this paper are merely the subsets of capabilities employed in 21st-century warfare.
14. Several text references helped to synthesize the thinking and construction of the graphics used in this article. Texts included *Global Trends 2015: A Dialogue About the Future with Nongovernmental Experts* (Washington, DC: U.S. National Intelligence Council Publication, December 2000); Toffler and Toffler; Arquilla and Ronfeldt, eds., *In Athena's Camp: Preparing for Conflict in the Information Age* (Santa Monica, CA: RAND, 1997); Arquilla and Ronfeldt, eds., *Networks and Netwars*; Winn Schwartau, *Information Warfare* (New York: Thunder's Mouth Press, 1994).
15. Extract: "Choking of Cancer—New drugs kill tumors from inside out," *Technology Review* (July-August 2002).
16. David E. Kaplan, "Run and Gun," *U.S. News and World Report* (30 September 2002). This article describes the capture of Ramzi Binalshib and a subsequent press release by the Pentagon indicating he is cooperating with the United States. The use of the public media to name detainees and articulate levels of cooperation are sure to prevent reentry into a terrorist cell as a trusted member and most likely limits the further trust and assignments of close cell associates still at large.
17. Daniel Pipes and Jonathon Schanzer, "Militant Islam's New Strongholds," *New York Post*, 22 October 2002.
18. Craig Hoyle and Andrew Koch, "Yemen Drone Strike: Just the Start?" *Jane's De-*
19. *Defense Weekly*, 8 November 2002, on-line at <www.janes.com/defence/air_forces/news/jdw/jdw021108_1_n.shtml>.
20. Richard Szafranski, "Neocortical Warfare? The Acme of Skill," *Military Review* (November 1994): 41-55.
21. NASA-developed futures briefing. See on-line at <www.dtic.mil/ndia/2001/testing/bushnell.pdf>. The briefing included the compilation of several futures studies from the CIA, DIA, military departments, academia, and other national-level entities. Future adversaries can hurt the United States swiftly, deeply, and inexpensively with commercial technologies developed outside of the Nation. United States defense research and development efforts alone cannot maintain a technological edge in future warfare. We must develop and employ new operating constructs and methods of warfare.
22. Schwartau, "Asymmetrical Adversaries," *ORBIS* (Spring 2000). This article provides a compilation of information warfare threats to the United States and cybermeans of employing asymmetrical attack.
23. Szafranski, 41-55.
24. Toffler and Toffler, 48-63.
25. The sensors envisioned for the future will have expanded capacity to sense energy, molecules, digital transactions, and activity patterns from space, cyberspace, land, sea, and air. Examples are "smart dust," cyber "sniffers," advanced remote spectral sensing, and thermal and seismic sensors, to name a few. Multimodal sensors might defeat any one type of camouflage or concealment tactic. These sensors have been written about in a variety of journals, trade publications, and scientific texts. See also a Defense Advanced Research Projects Agency (DARPA) director's statement to the U.S. Senate Armed Services Committee, 10 April 2002, for complementary technologies. On-line at <www.darpa.mil/body/NewsItems/pdf/DARPAtestim.pdf>.
26. Julie A. Rosen and Wayne L. Smith, "Influence Net Modeling for Strategic Planning: A Structured Approach to Information Operations," Preprint-Phalanx (December 2000), on-line at <www.inet.saic.com/inet-public/welcome_to_saic.htm>.
27. Ibid.
28. William M. Arkin, "Mapping the Minds in Iraq's Regime," *Los Angeles Times*, 1 September 2002. For a defense industry contractor's support of Influence Net Modeling capabilities, see <www.inet.saic.com/inet-public>.
29. Jan S. Breemer, "War As We Knew It: The Real Revolution in Military Affairs/Understanding Paralysis in Military Operations," Occasional Paper 19, Center for Strategy and Technology, Air War College (December 2000), 17. See also Brian Bender, "U.S. Soft Bombs Prove NATO's Point," *Jane's Defence Weekly*, 12 May 1999, 4.
30. Maryann Lawlor, "National Security Tackles Tough Security Issues," *Signal* (August 2002): 23-26.
31. Vitaly N. Tsygichko, ed., "Information Weapons as a New Means of Warfare," chap 3, "Information Challenges to National and International Security," Moscow PIR Center, Foreign Broadcast Information Service (FBIS), (Document ID: CEG20020110000313[100], entry date 10 January 2001, version 3), 69-109. For a Chinese view of future warfare and capabilities, see Qiao Liang and Wang Xiangsui, *Unrestricted Warfare* (Beijing: PLA Literature Arts Publishing House, 1999), translation FBIS.
32. Secretary of Defense Donald H. Rumsfeld, address to the House Armed Services Committee, Washington, D.C., 5 February 2003.
33. Szafranski, "Fighting Stupid, Defending Smart," *Aerospace Power Journal* (Spring 2002), on-line at <www.airpower.maxwell.af.mil/airchronicles/apj/apj02/spr02/spr02.html>.